

NOVEMBER/DECEMBER 2023

GPH32/DPH32 — NUCLEAR PHYSICS

Time : Three hours

Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Give the assumptions of the theory of the ground state of deuteron.
2. State the meson theory.
3. How does the existence of neutrino explain the beta decay?
4. What are the quantities that are conserved during the nuclear reactions?
5. How nucleus are assumed in Liquid drop model? Mention few applications of liquid drop model.
6. What is nuclear isomerism?
7. Write the main differences between Cyclotron and Linear Accelerator.
8. How does an Ionization Chamber work?
9. What are baryons?
10. Give an example for weak interactions.



SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Explain in short about the spin dependence of nuclear forces.

Or

- (b) Write a brief note on "nuclear energy levels".

12. (a) Explain the Q value of a nuclear reaction.

Or

- (b) Write a note on Compound nucleus model and tell about the Ghosal's experiment.

13. (a) Write a note on Fermi gas model.

Or

- (b) What is the collective model of the nucleus? Explain it.

14. (a) How does a GM counter work? How is it different from an ionisation chamber?

Or

- (b) Explain the "Neutron Activation Analysis" in short.

15. (a) Classify the fundamental forces with examples.

Or

- (b) Explain the CPT theorem.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Give the detailed account of Meson Theory of Nuclear Forces.

17. Explain in detail about Gamow's theory of alpha decay.

18. Why is the Shell model of the nucleus proposed? What are the basic assumptions of the shell model? What is the nucleus shell model? Give the evidence supports the shell model.

19. With a neat diagram explain the working of the Large Hadron Collider, and why it is important?

20. Explain Gell-Mann- Okubo mass formula for octet and decuplet of hadrons.

